

## THE INVENTORS CLAIM:

1. An automated computer controlled monitoring system for determining the concentration of an analyte of interest in ground water, comprising:

a sampling device within a well casing and comprising valve means and water level sensor means to provide a ground water sample of predetermined volume,

a treatment assembly to receive the sample from the sampling device, said treatment assembly comprising means to provide a calibration standard for the analytical assembly, and one of (a) a treatment cartridge to filter the sample and a calibration sensor, (b) a source of analyte-free water connected with the treatment assembly,

a calibration assembly to add a standard of predetermined concentration of the analyte and volume to the water from the treatment assembly,

an analytical assembly comprising instrumentation for analysis of analytes of interest,

sensor means in the analytical assembly for sensing concentration of the analyte in the sample, and

means to receive analysis and assay data from the analytical module to transmit the data to a cognizant agency.

2 2. An automated monitoring system according to Claim 1,  
and further comprising a calibration loop for establishing a  
predetermined amount of standard solution.

2 3. An automated monitoring system according to Claim 1,  
and further comprising:

means to provide a matrix modifier, and

4 a valved loop defining a volume of matrix modifier  
introduced into the sample chamber.

2 4. An automated system according to Claim 1, wherein the  
sampling assembly is disposed in a sampling module,

4 the treatment assembly is disposed in a treatment module  
with a sample treatment cartridge and a calibration sensor, and

6 the analytical assembly is disposed in an analytical  
module.

5. An automated monitoring system according to Claim 1,  
2 wherein:

4 the analytical and calibration assemblies are disposed in a  
casing separate from the monitoring well casing to provide improved  
environmental control, ease of maintenance and security.

6. An automated monitoring system according to Claim 1,  
2 and further comprising means for stirring the ground water sample  
to enhance volatilization of concentration of the analyte in the  
4 sample.

7. An automatic monitoring system according to Claim 1,  
2 wherein trichloroethylene is the analyte of interest, and  
monitoring and analysis are performed utilizing an optrode  
4 assembly and procedure.

8. An automated computer-controlled method for determining concentration of an analyte of interest in ground water, the method comprising the steps of:

collecting and transporting a ground water sample from a well casing to a preparatory treatment assembly,

performing one of (a) passing said water sample through filtering media in a treatment assembly to remove the analyte of interest, (b) supplying water having no analyte therein from an external source,

passing water from an external source to a calibration assembly for addition of a calibration standard,

passing the water sample with the calibration standard therein to the analytical module for analysis,

analyzing one of (a) the sample, (b) the standard, by instrumentation appropriate for the analyte of interest, and recording analysis results,

transporting fluids from said analytical assembly to disposal means, and

relaying analysis data from the analytical assembly to a communication system for transmission to a cognizant agency.

9. A method according to Claim 8, and further comprising:

2 introducing calibration standards into a standard container  
and transporting the standard by a sample vessel.

10. A method according to Claim 8, and further comprising

4 the step of:

calibrating said instrumentation for analysis by providing  
4 a predetermined amount of standard solution via a calibration loop  
and passing it into the sample chamber.

11. A method according to Claim 10, and further

2 comprising:

passing the sample from a well casing to a calibration  
4 system to prepare blanks or standards for addition of the standard  
directly for use in the analytical assembly.

12. A method according to Claim 8, and further comprising  
the steps of:

introducing the sample in a sample vessel until a lower  
sensor is satisfied, and

adding water to the sample vessel from a water treatment  
cartridge until an upper water level sensor in the sample vessel is  
satisfied to provide a predetermined dilution.

13. A method according to Claim 8, wherein the analyte of  
interest is trichloroethylene and said instrumentation for analysis  
comprises an optrode assembly.